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ENTOMOLOGICAL NEWS

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Some Notes on the Habits and Parasites of Native Wood-Roaches in Ohio (Orthoptera: Blattidae)

By L. R. EDMUNDS, Department of Zoology and Entomology, The Ohio State University, Columbus, Ohio

During the months, December through April of 1950–51, a series of 459 wood-roach egg capsules was collected from wooded areas in Franklin and Delaware Counties, Ohio. These egg cases were collected in a variety of places, such as under boards and in piles of cut fire wood, but by far the largest numbers were found under the loose bark of fallen dead trees. The adult roaches seem to have certain places in which they congregate and thus in a small area the writer found as many as 184 egg cases deposited within a few feet of each other under the bark of a tree. The capsules sorted readily into two size groups. The larger capsules, some 429 in number, are believed to be those of *Parcoblatta pensylvanica* (DeGeer), the only large native roach known to occur in these counties. The smaller capsules, 30 of them, are very likely those of *Parcoblatta virginica* (Brunner), which is known to be plentiful in the area investigated. According to Dr. Edward S. Thomas, of the Ohio State Museum, *Ischnoptera deropeltiformis* (Bruner) has been taken in Franklin County, but is quite rare.

The collected wood-roach ootheca were incubated in glass tumblers covered with white organdy, held in place by a rubber band. The tumblers containing the egg sacs were placed in an outdoor insectary and were checked daily.

The Pennsylvania wood-roach, *P. pensylvanica*, is one of the common insects inhabiting the woods of Ohio. Records from

the Insect Collection of the Department of Zoology and Entomology of The Ohio State University, and from The Ohio State Museum show that these insects have been collected in fifty counties, widely scattered over the state.

The biology and life history of this roach have been worked out to a considerable degree in St. Louis County, Missouri, by Rau (1940), who states that the enemies of the wood-roach seem to be few in number. However, some additional interesting facts have been noted by the writer in field studies in Franklin and Delaware Counties, Ohio, and are summarized as follows.

Pennsylvania wood-roach adults and nymphs are commonly found in old buildings bordering on wooded areas, in piles of cut or fallen timber, and under the loose bark on dead trees. They usually run rapidly when the cover under which they are hiding is removed by the collector. In the adult stage, the male is fully winged and capable of flight, while the flightless female has short wings which normally do not extend to the tip of the abdomen. During the mating season in the spring, the males have been observed flying in the evenings. They are positively phototactic at this time, and often come to lights. Due to this habit they are sometimes attracted at night to lighted windows or lights around houses, a considerable distance from wooded areas. The females may invade homes bordering on wooded areas. Although it is not uncommon to find wood-roaches in homes near woods and at campsites, they are not as annoying as the domestic roaches, and do not have the characteristic roach odor. The over-wintering stage of the Pennsylvania wood-roach is the nymph, which can be collected in the woods during the winter months. These nymphs range in size from very small to some that are in the last nymphal instars. No live adult roaches were collected in the winter months by the writer. Some of the larger nymphs mature in early spring and begin to produce egg-capsules in May. The female roach carries the flat yellow-brown ootheca protruding from her posterior end for two or three days before dropping it with no attempt to conceal it. However, the

ootheca are sometimes rather difficult to find because of the secretive habits of the adults, and because after deposition, they seem to deepen in color and resemble their background of dirt and bark. The average number of eggs in each capsule is thirty-two; these eggs are usually viable and the nymphs emerge in from 30 to 40 days. The young roaches on hatching are white, and it is several hours before they assume the dark brown color characteristic of older nymphs.

The over-wintering egg capsules when collected under natural conditions are often found to be broken and empty. The ootheca were sorted under a binocular microscope soon after they were collected, and the damaged capsules were separated from those that were complete and normal in appearance. This sorting was done to make it easier to observe parasite emergence, as special attention could then be given to the normal appearing capsules. All of the egg capsules were incubated for several months, some of them for over a year, and within this period of time not a single wood-roach nymph was observed to emerge from them. Many parasites did emerge from some of the egg cases, and these were captured and preserved in vials of alcohol. Only one parasite emerged from the small capsules, *Hyptia harpyoides* Bradley. The following data refer to the parasites from the larger capsules.

For identification, these parasites were sent to C. F. W. Muesebeck of the Division of Insect Identification. The determinations of the hymenopterous parasites were made by B. D. Burk and Luelle M. Walkley, and the dipterous parasites by C. W. Sabrosky and W. W. Wirth.

A total of 1,213 parasitic Hymenoptera were obtained. Evaniidae emerged from 30 egg capsules, one individual from each capsule. These parasites were identified as *Hyptia thoracica* (Blanchard), and specimens of an undescribed species of *Hyptia*. The remaining Hymenoptera emerged in large numbers from other parasitized ootheca, 262 specimens from 11 egg capsules were identified as *Systellogaster ovivora* Gahan, and 921 specimens of an undescribed species belonging to the genus *Syntomophyrum* emerged from ten egg capsules. This latter

TABLE I. Compiled Data on Natural Parasitism of Wood-Roach Egg Capsules in Franklin and Delaware Counties, Ohio, for Years 1950 and 1951

Date Collected	Egg Capsules Collected	Parasitism by Evaniidae	Other Parasites	Capsules Showing Previous Emergence*
10–29–50	4	0	1	1
3–18–51	58	11	2	1
3–23–51	26	7	1	3
3–28–51	36	0	0	0
4–20–51	140	5	7	3
4–21–51	6	0	0	0
4–27–51	184	7	4	4
5–5–51	3	0	1	0
5–7–51	1	1	0	0
Total	459	31	16	12

* Capsules showing previous emergence are not included in the percentage of parasitism as stated in the body of the paper.

new species is being described by B. D. Burk at the U. S. National Museum.

The dipterous parasites were identified as *Coenosia basalis* Stein, of which one specimen emerged from a single capsule, and a species of *Megaselia* of which four specimens emerged from a capsule.

A study of the accumulated data on parasite emergence (see Table I) from all capsules of both sizes shows that 12.4% of the capsules collected during the winter months were parasitized. The evaniids alone parasitized 6.7% of the over-wintering wood-roach ootheca in Ohio. This is a much higher percentage of parasitization than had been previously suspected.

Acknowledgments are made to Dr. Carl Venard of The Ohio State University and to Dr. Edward S. Thomas of The Ohio State Museum for their assistance in this study; also to Charles A. Triplehorn, Richard D. Alexander, and Elbert A. Sleeper of the Department of Zoology and Entomology of The Ohio State University for their contributions of egg capsules.

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Thiodia Hb. as not a North American Genus (Lepidoptera, Tortricidae)*

By NICHOLAS OBRAZTSOV, Sea Cliff, Long Island, N. Y.

In the American entomological literature *Thiodia* Hb. is mentioned as a genus which is usually known among European entomologists as *Semasia* (Stph.) H.-S. or *Phaneta* Stph. The genus *Thiodia* was established in 1825 by Hübner for two species, *citrana* Hb. and *sulphurana* Hb. (= *Pyrausta rhododendronalis* Dup.), a Tortricid and a Pyralid. Stephens (1852) recognized only the first of both species as *Thiodia* Hb. and considered the genus as monotypic. Apparently it was Walsingham (1897) who first enlarged the idea of this genus; he selected *citrana* Hb. as the genotype of *Thiodia* Hb. Fernald (1902) considered *Thiodia* as a genus with several North American species. Heinrich (1923) published a revision of Nearctic Eucosmini and conceived of *Thiodia* as a smaller and more or less natural group of species. However, he has noted that all the North American species of this genus differ from the genotype of *Thiodia* Hb. in the general shape of the valvae and in superficial characters, and found that for the American species "the form of genitalia in (*Ioplocama*) *Thiodia formosana* Clemens is much more representative."

* Contribution from the Entomological Division of the Zoological Collection of the Bavarian State, Munich.

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* Contribution from the Entomological Division of the Zoological Collection of the Bavarian State, Munich.

In the Palearctic fauna we find a series of species which are similar in their characters to *citrana* Hb., the genotype of *Thiodia* Hb. This group of species, but not the American species, is the very same genus *Thiodia* Hb. The American species are closely related to *Eucosma* Hb. while the Palearctic *Thiodia* have more resemblance to *Rhyacionia* Hb. in their genitalia. The correct generic name for the Nearctic species, called *Thiodia* Heinr. (non Hb.), is *Phaneta* Stph. 1852. (Genotype: *Cochylis pauperana* Dup.); this name has priority for *Calosetia* Stt. 1859 (Genotype: *Tortrix nigromaculana* Hw.), and *Ioplocama* Clem. 1860 (Genotype: *Iopl. formosana* Clem.). The genus *Eriopsela* Gn. 1845 (Genotype: *Olethreutes quadrana* Hb.) does not belong to the synonymy of *Phaneta* and is an independent one; it differs from *Phaneta* chiefly in the female genitalia (cf. Pierce & Metcalfe, 1922, p. 67, t. XXIII; Obraztsov, 1946, p. 39).

Genus **Thiodia** Hb. 1825.

Genotype: *Agapeta citrana* Hb. 1822.

Synonymy.—*Agapeta* (part.) Hübner, Syst.-alph. Verz., 1822, p. 59; *Thiodia* Hübner, Verz. bek. Schm., 1825, p. 391; *Cochylis* (part.) Treitschke, Schm. Eur., VII, 1829, p. 233; *Grapholitha* (part.) Treitschke, *op. cit.*, X (3), 1835, p. 120; *Dichrorampha* (part.) Guenée, Ann. Soc. Ent. France, (2) III, 1845, p. 186; *Catoptria* (part.) Guenée, *ib.*, p. 189; *Semasia* (part.) Herrich-Schäffer, Syst. Bearb. Schm. Eur., IV, 1851, p. 244; *Botropteryx* Caradja, Iris, XXX, 1916, p. 63 (Genotype: *Grapholitha sulphurana* Chr. 1888); *Rhyacionia* (part.) Pierce & Metcalfe, Genit. Brit. Tortr., 1922, p. 81; *Eucosma* (part.) Meyrick, Rev. Handb. Brit. Lep., 1927, p. 545, 551.

Fore wing smooth; termen more or less straight; male without costal fold, but on the upper surface near the base of vein A_{2+3} with a fovea full of androconial scales; 12 veins; R_1 from middle of cell; R_2 from cell halfway between R_1 and R_3; R_4 and R_5 separate, the latter to termen; no internal vein of cell; M_2, M_3 and Cu_1 approximate at termen; Cu_2 straight, from or from before 2/3 of cell.

Hind wing with 8 veins; R and M_1 approximate, rarely anastomosed or stalked; M_3 and Cu_1 stalked; in male on the

upper surface of wing near the base of internal vein of cell a tuft of long hairs.

Male genitalia with valvae simple; no distinct neck incurvation; cucullus sharply defined, but scarcely separate, with a more or less developed basal knoll and pollex; sacculus simple, not heavy spined; processus basalis (costal hook) of valva developed; no harpe (clasper). Uncus short, weak, pointed; socii short, finger like, at base fusing with uncus; gnathos weakly chitinized. Aedeagus straight or curved, moderate, more or less pointed and finely toothed distally; cornuti a cluster of elongate spines.

Female genitalia as moderately long, narrow ovipositor; ductus bursae moderately long, sometimes with a fine cuticular sculpture; lamina dentata two stout thorns.

The wing venation is like *Phaneta* Stph., but R_2 of fore wing is not approximated to R_1; as a rule the hind wing veins M_3 and Cu_1 approximate, at most stalked, but not tending to unite. The male sexual characters, a fovea of fore wing at base of vein A_{2+3} and a tuft of hairs near the base of cell of hind wing, are absent in *Phaneta* and constant in all the species of *Thiodia*. The fovea mentioned is likewise present in male of *Foveifera* Obr. and in many species of *Gypsonomoides* Obr. and *Hendecaneura* Wlsm. In the male genitalia, *Thiodia* differs from *Phaneta* in the pointed uncus fusing with the socii and in the shape of the valvae; *Phaneta* has no pollex. Especially typical of *Thiodia* is its long ovipositor.

The genus is a derivative of *Rhyacionia* Hb.

The genus *Thiodia* Hb. was fully characterized by Kennel, 1916 (p. 531) and by Obraztsov, 1946 (p. 40), but both authors erred in their statement of a costal fold in the hind wing of the male.

Illustrations.—1) Venation of wings: Kennel, 1908, t. II fig. 53.

2) Fovea of fore wing: Kennel, 1908, t. II fig. 54; 1916, t. XX fig. 36a.

3) Male genitalia: Pierce & Metcalfe, 1922, t. XXVIII (*citrana*); Heinrich, 1923, t. 2 fig. 16.

4) Female genitalia: Pierce & Metcalfe, 1922, t. XXVIII (*citrana*).

List of Palearctic Species

mirana (Car.)
mirana Caradja, Iris, XXX, 1916, p. 62 (*Semasia*).—Sibiria m. or.

citrana (Hb.).
citrana Hübner [Samml. eur. Schm., Tortr., 1796–99, t. 29 fig. 185; non bin.], Syst.-alph. Verz., 1822, p. 59 (*Agapeta*); ? *messingiana* (part.) Lederer, Wien. Ent. Monatschr., III, 1859, p. 399.—Europa; Asia c. & m. oc.

spp. **major** Rebel, Ann. Hofmus. Wien, XVIII, 1903, p. 321 (*Semasia*).—Peninsula Balcanica.

spp. **sardiniana** Schawerda, Zschr. Österr. Ent.-Ver., XXI, 1936, p. 79 (*Semasia*).—Sardinia.

sulphurana (Chr.)
sulphurana Christoph, Horae Soc. Ent. Ross., XXII, 1888, p. 311 (*Grapholitha*).—Ucraina m.; Rossia or.; Armenia.

caradjana Kenn.
caradjana Kennel, Pal. Tortr., 1916, p. 533, t. XX fig. 40 (*Thiodia*).—Armenia.

anatoliana Kenn.
anatoliana Kennel, Pal. Tortr., 1916, p. 532, t. XX fig. 39 (*Thiodia*).—Armenia; Persia s.; ? Libanon.

placidana (Stgr.)
placidana Staudinger, Berl. Ent. Zschr., (1870) 1871, p. 281 (*Grapholitha*).—Rossia m. or.; Armenia.

tscheliana (Car.)
tscheliana Caradja, Acad. Rom. Mem. Sect. Stiint., (3) IV (8), 1927, p. 392 (*Semasia*).—China s.

lerneana (Tr.)
lerneana Treitschke, Schm. Eur., X (3), 1835, p. 120 (*Grapholitha*).—Europa c.m.; Gallia m. or.

(?) **azukivora** Mats.
azukivora Matsumura, 6000 Ill. Ins. Jap., 1931, p. 1076, fig. (*Thiodia*).—Japonia.

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Swarming of Blacus sp. in California (Hymenoptera: Braconidae)

BY PAUL H. ARNAUD, Natural History Museum, Stanford University, California

Published observations on the swarming of *Blacus* males are comparatively few and all, so far, appear to be limited to the European literature. The following note is the first North American record of the swarming habit of *Blacus* males. The writer's brief observations began on the high foggy morning of June 5, 1948 when a dancing swarm of insects was noted in his backyard at Redwood City, San Mateo Co., California. A few swishes of the net resulted in the capture of 35 specimens, about half of the swarm. Specimens sent to Mr. C. F. W. Muesebeck [1]

[1] I am indebted to Mr. C. F. W. Muesebeck of the Bureau of Entomology and Plant Quarantine, Washington, D. C., for the original generic determination and references to literature. He explained that *Blacus* is unrevised in North America. Specimens were then forwarded to Mr. A. W. Stelfox of Dublin, Ireland, to whom I am also indebted, for their comparison with certain of the European species in his collection. He indicated the specimens were not representative of any European species he possessed but believed them to be "closely related to *ruficornis* Nees and *tripudians* Hal.," species which have been reported swarming. This *Blacus* is, therefore, probably not introduced, but native to California.

were kindly identified as males of an undescribed species of *Blacus*. This was the only time that these small blackish wasps were observed swarming in 1948. In 1949, at the same location, the swarming *Blacus* males were noted on many early evenings between the dates of April 28th and June 26th. Those swarmings were noted most frequently above or to the sides of a between the dates of April 28th and June 26th. These swarmprobably did not contain more than a hundred individuals, and they occupied the space of a sphere approximately two feet in diameter, which would move rapidly up and down. On windy evenings, the swarm when caught in a gust of wind would momentarily be blown a foot or two to one side after which it would reform quickly into its original position. At no time were any large females noted flying about or entering into the swarms, as has been noted by Benson (1944).

In the British literature, the swarming of *Blacus* was first noted by Haliday (1836) with his original description of *Blacus tripudians*. Since this first observation, the following English and Irish records have been seen by the writer. Marshall (1889) reported *B. ruficornis* Nees swarming, Donisthorpe (1936) reported *B. paganus* Hal. swarming, and Stelfox (1941) and Benson (1944) reported *B. tripudians* Hal. swarming.

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Unusual Catches in Light Traps

By S. W. Frost, The Pennsylvania State College

During the operation of approximately 20 light traps over a period of 5 years numerous specimens of Euplexoptera and Pselaphidae have been taken. The Euplexoptera *Labia minor* (L) were especially surprising, for these insects shun light, hide during the day, and seldom spread their range by means of flight. However, they are scavengers, are known to wander at night, and when abundant their appearance at light traps might not be unusual. Euplexoptera have been taken from three different localities sometimes as many as 10 specimens on a single night. Evidently they were not attracted by the light.

Two species of Pselaphidae, still unidentified, were taken in considerable numbers chiefly from one trap operated at Martinsburg, Pennsylvania. This trap was located in an open area without trees or shrubs in the vicinity. It was placed close to a factory processing sweet corn with a pond impounding waters highly charged with starches. Pselaphidae are generally difficult to obtain and usually collected one or two at a time. They avoid light and are generally found beneath decayed leaves, in rotten logs, in sphagnum, or in ants' nests. The collection of over 200 specimens from light traps chiefly during June is noteworthy. These insects are minute, difficult to separate from the thousands of larger insects taken in traps, and many may have been overlooked. Their presence is difficult to explain.

This introduces the question of accidental catches in light traps. Certain insects that feign death, such as the Curculionidae and Elateridae, are frequently found in light traps and it is felt that these captures are often accidental. This could happen only when a trap is hung upon a tree or bush where such insects occur. On windy nights the insects may be dislodged and thus gain entrance to the traps.

Scavengers such as roaches, even the wingless forms, are occasionally found in light traps. They are apparently in search of food and wander into the traps. In the tropics, where roaches are a real problem, I have often watched them skirt the edge of

lighted areas in search of dead insects that in turn have been attracted to lights.

Spiders and light bodied insects are sometimes drawn into the suction type of light traps. Small insects may be taken even when these traps are operated during the day or on nights when the lights are turned off. Obviously they were not attracted by the light.

Formica sanginea subintegra Emery Raiding Its Own Subspecies

On August 16, 1951, while preparing a picnic supper at North Park, Allegheny Co., Pennsylvania ("North Carolina" Picnic Area), I noticed a *Formica sanguinea* raid in progress at an ant-nest near the picnic shelter. There were many couples and small groups of ants locked in combat over an area averaging roughly three feet in diameter. On looking closer I found that these ants were not *sanguinea* versus *Formica fusca* as might be expected, but that *sanguinea* was fiercely fighting *sanguinea.* Coming from the nest entrances were *sanguinea* workers carrying pupae and larvae. The loaded workers were proceeding southeastwardly from the raided nest. This nest lacked a mound, the entrances leading under a few scattered stones. Only these entrances, the fighting ants, and a hardly noticeably size-uniformity of the pebbles in the area marked the presence of an ants' nest.

Following the line of raiding ants, I found the nest from which they had begun their raid. It was approximately 150 feet from the first nest, and (as the picnic shelter is located on the top of a knoll) about 40 feet lower in elevation. This nest was a mound approximating 18 inches across and 10 inches high on the downhill side.

No adults were found being transported along the path of the raid. Nor were any individuals of *fusca* noted either along this line or at the site of the first nest. At this time a few *fusca* were found on the nest from which the raid came.

Nine ants were collected at the site of the raid. Because of the duties attendant upon picnicing, further observations were curtailed. The time during which the raid was observed was between 5:30 and 6:00 P.M.

Dr. Marion R. Smith of the Bureau of Entomology and Plant Quarantine, who kindly identified the nine specimens as *Formica subintegra* Emery, has written to me that this is the common form of *sanguinea* in eastern states and Canada at low elevations and in warm situations.

On September 11, I returned to the area where the raid had been discovered. The nest that had been raided was no longer occupied. Neither *subintegra* nor *fusca* individuals were in the immediate vicinity. Overturning stones and digging in the area likewise did not disclose any ants. Going to the second nest, I broke it open, and was surprised at the preponderance of *fusca* individuals. Both this species and *sanguinea* poured out in large numbers, but a rough count of the ants as they ran about over the broken section of the nest showed that the *fusca* individuals there outnumbered the *sanguinea* by at least fifteen to one. I refrained from damaging the nest further, as I hope to make observations on it this coming year.

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Notes and News in Entomology

Under this heading we present, from time to time, notes, news, and comments. Contributions from readers are earnestly solicited and will be acknowledged when used.

A New Vitamin Discovered in Insect Nutrition: There is nothing particularly novel about discoveries of general interest being made with insects but none the less there is a certain amount of gratification to entomologists each time another ex-

ample comes along. In the past there have been such important discoveries as the chromosome mechanism of sex determination worked out by C. E. McClung, the development of much of modern genetics with *Drosophila* by T. H. Morgan and his many followers, and the discovery of the cytochrome enzyme systems by D. Keilin. One may say that McClung and Morgan were general zoologists who happened to find it convenient to use insects as their experimental animals, but Keilin was an orthodox entomologist who made his discovery incidentally to studying the nature of the red color in the "organe rouge" of *Gastrophilus* larvae.

Recently, incidentally to the study of the nutritional requirements of the mealworm, *Tenebrio molitor,* G. Fraenkel discovered another vitamin in the B series.[1] Tentatively, this was called B_T, with the "T" standing for *Tenebrio.* Subsequently, B_T has been identified as carnitine, a quarternary nitrogen compound with the empirical formula of $C_7H_{15}O_3N$.[2, 3] Carnitine has been known for a good many years as a chemical extractable from muscle, but its physiological significance was and still is unknown. It had not previously been suspected of being a vitamin.

By definition, a vitamin is an organic chemical which must be supplied to an animal in very small amounts. It follows that the animal in question is unable to synthesize the compound for itself. And, further, it is scarcely to be called surprizing that some animals can synthesize some of these chemicals whereas other species cannot do so. Bacteria, yeast, and plants in general synthesize and use these compounds; animals use them too but vary greatly in their ability to synthesize them. Thus, nicotinic acid (or niacin to use its currently favored name which seeks to divorce the holy vitamins from association with habit-forming weeds) is a vitamin for dogs, pigs, and man but not for rats or hamsters. Insects in general do not require vitamin C

[1] FRAENKEL, G. Arch. Biochem. + Biophysics, 34: 457–467. 1951.
[2] FRAENKEL, G. Arch. Biochem. + Biophysics, 34: 468–477. 1951.
[3] CARTER, H. E., P. K. BHATTACHARYYA, K. B. WEIDMAN and G. FRAENKEL. Arch. Biochem. + Biophysics, 35: 241–242. 1952.

(ascorbic acid) in their diet but they have plenty in their tissues; presumably they synthesize it although this has not been directly demonstrated as yet.

With the above preamble, it is interesting to consider where carnitine is found. It occurs in muscle, commercial beef extracts showing 1.5 to 3%, and to a less extent in other tissues such as liver, heart, lungs and intestines. Blood is a relatively poor source but milk is a good source (and during the search for B_T carnitine was first concentrated from whey). Eggs have very little. Most plant and vegetable tissues are poor sources except yeast and wheat germ both of which are fairly good. It would seem, then, that carnitine is rather widely distributed, and that it reaches its highest concentration in muscle.

Tests with various organisms show that carnitine is required by *Tenebrio molitor, T. obscurus* and *Palorus ratzeburgi* but not by *Tribolium confusum* or *Dermestes vulpinus.* It is not required by rats, guinea pigs, chickens or several protozoa or bacteria tested. In short, it is at present known as a dietary requirement (= vitamin) for only the above named three closely related beetles. A similarly restricted requirement for linoleic acid and vitamin E by only three species of the moth genus *Ephestia* was shown by Fraenkel and Blewett some years ago.[4] These seem to be cases of generally necessary compounds that are vitamins for only a few species which have lost the ability to synthesize them. There is as yet no satisfying answer to the question why some species have lost the ability to synthesize necessary compounds but such cases surely emphasize the desirability of using a large variety of insects before generalizing on physiological processes within the class.

A. G. RICHARDS

[4] FRAENKEL, G. + M. BLEWETT. Jour. Exp. Biol., *22*: 172–190. 1946.

List of Titles of Publications Referred to by Numbers in Entomological Literature in Entomological News.

1. American Midland Naturalist. Notre Dame, Indiana.
2. American Museum Novitates. New York, N. Y.
3. American Naturalist. Garrison-on-Hudson, New York.
4. Annals of Applied Biology. London.
5. Annals of the Entomological Society of America. Columbus, Ohio.
6. Annals and Magazine of Natural History. London.
7. Annales Academia Brasileira Sciencias. Rio de Janeiro.
8. Anales del Instituto de Biologia Mexico. Mexico City.
9. Anatomical Record. Philadelphia.
10. Arkiv för Zoologie. K. Svenska Vetenkapsakademien i. Stockholm.
11. Arquivos de Higiene e Saude Publica. São Paulo.
12. Biological Bulletin. Woods Hole, Massachusetts.
13. Bios, Rivista Biol. Geneva.
14. Boletin de Entomologia Venezolana. Caracas.
15. Boletin del Museo de Historia Natural "Javier Prado." Lima, Peru.
16. Boletin do Museu Nacional do Rio de Janeiro. Brasil.
17. Bull. Acad. Sci. (Izvestia Akad. nauk) U S S R (S. biol.).
18. Bulletin of the Brooklyn Entomological Society. New York.
19. Bulletin of Entomological Research. London.
20. Bulletin of the Museum of Comparative Zoology. Cambridge, Mass.
21. Bulletin of the Southern California Acad. of Sciences. Los Angeles.
22. C. r. Acad. Sci. (Doklady Akad. nauk) U S S R. Leningrad.
23. Canadian Entomologist. Guelph, Canada.
24. Canadian Journal of Zoology. Ottawa, Canada.
25. Ecological Monographs. Durham, North Carolina.
26. Ecology. Durham, North Carolina.
27. Entomologica Americana. Brooklyn Ent. Society, New York.
28. Entomologist's Monthly Magazine. London.
29. Entomological Record and Journal of Variations. London.
30. The Entomologist. London.
31. Florida Entomologist. Gainesville, Florida.
32. Frontiers. Philadelphia, Pennsylvania.
33. Great Basin Naturalist. Provo, Utah.
34. Iowa State College Journal of Science. Ames, Iowa.
35. Journal of Agricultural Research. Washington, D. C.
36. Journal of Animal Ecology. London.
37. Journal of Economic Entomology. Menasha, Wisconsin.
38. Journal of the Elisha Mitchell Science Society. Chapel Hill, N. C.
39. Journal of Entomology and Zoology. Claremont, California.
40. Journal of Experimental Biology. London.
41. Journal of Experimental Zoology. Philadelphia, Pennsylvania.
42. Journal of Heredity. Baltimore, Maryland.
43. Journal of the Kansas Entomological Society. Lawrence, Kansas.
44. Journal of Morphology. Philadelphia, Pennsylvania.
45. Journal of the New York Entomological Society. New York.
46. Journal of Parasitology. New York.
47. Journal of the Tennessee Academy of Sciences. Nashville, Tenn.
48. Journal of the Washington Academy of Sciences. Washington, D. C.
49. Memorias do Instituto Oswaldo Cruz. Rio de Janeiro.
50. Microentomology. Stanford University, California.
51. The Microscope. London.
52. Mosquito News. Albany, New York.
53. Nature. London.
54. Nature. Washington, D. C.
55. Le Naturaliste Canadien. Quebec.

56. Natural History. New York.
57. Occasional Papers, Mus. of Zool., Univ. of Michigan. Ann Arbor.
58. Ohio Journal of Science. Columbus, Ohio.
59. Opinions and Declarations. Intern. Com. Zool. Nomencl. London.
60. Pan-Pacific Entomologist. San Francisco, California.
61. Parasitology. London.
62. Proceedings of the Academy of Natural Sciences. Philadelphia.
63. Proceedings of the Biological Society of Washington. Wash., D. C.
64. Proceedings of the California Academy of Science. San Francisco.
65. Proceedings of the Entom. Soc. of Washington. Washington, D. C.
66. Proceedings of the Hawaiian Entomological Society. Honolulu.
67. Proceedings of the National Acad. of Sciences. Washington, D. C.
68. Proceedings of the Royal Entomological Society of London. Ser. A.
69. Proceedings of the Royal Entomological Society of London. Ser. B.
70. Proceedings of the Royal Entomological Society of London. Ser. C.
71. Proceedings of the U. S. National Museum. Washington, D. C.
72. Proceedings of the Zoological Society of London. London.
73. Psyche, A Journal of Entomology. Boston, Massachusetts.
74. Quarterly Journal of Microscopical Science. London.
75. Quarterly Review of Biology. Baltimore, Maryland.
76. Revista Academia Columbiana de Cien. Exact. Fis. y Nat. Bogotá.
77. Revista Chilena de Historia Natural. Valparaiso, Chile.
78. Revista Instituto Salubridad y Enfermedades Tropicales. Mexico.
79. Revista Sociedad Mexicana de Historia Natural. Mexico City.
80. Science. Washington, D. C.
81. Scientific Monthly. New York.
82. Smithsonian Miscellaneous Collections. Washington, D. C.
83. Transactions of the American Entomological Society. Philadelphia.
84. Transactions of the Amer. Micros. Soc. Menasha, Wisconsin.
85. Transactions of the Illinois State Academy of Sciences. Springfield.
86. Transactions of the Kansas Acad. of Sci. Manhattan, Kansas.
87. Transactions of the Royal Canadian Institute. Toronto.
88. Transactions of the Royal Entomological Society. London.
89. U. S. Dept. of Agric., Farmer's Bulletins. Washington, D. C.
90. U. S. Dept. of Agric., Technical Bulletins. Washington, D. C.
91. University of California Publications in Entomology. Berkeley.
92. University of California Publications in Zoology. Berkeley.
93. University of Kansas, Science Bulletins. Lawrence, Kansas.
94. Ward's Natural Science Bulletin. Rochester, New York.
95. Zoologica. New York.
96. American Journal of Public Health. Boston.
97. American Journal of Tropical Medicine. Baltimore.
98. Annals of Tropical Medicine and Parasitology. Liverpool.
99. Canadian Journal of Research. Section E, Medical Sciences, Ottawa.
100. Evolution. New York.
101. Mitteilungen der schweitzerischen entomologischen Gesellschaft, Bern.
102. Revista de Entomologia. Rio de Janeiro, Brasil.
103. Proceedings of the Royal Society of London.
104. Anales de la Escuela Nacional de Ciencias Biologicas. Mexico.
105. Journal of Cellular and Comparative Physiology. Philadelphia.
106. Redia. Florence, Italy.
107. Annales de la Société Entomologique de France. Paris.
108. Bulletin de la Société Entomologique de France. Paris.
109. Notulae Naturae. Philadelphia.
110. L'Entomologiste. Paris.
111. Revista Brasiliera de Biologia. Rio de Janeiro.
112. Eos, Revista Española de Entomologia. Madrid.
113. Minist. de Agri. de la Nación, Inst. Sanidad Vegetal, Buenos Aires.

Current Entomological Literature

COMPILED BY R. G. SCHMIEDER AND J. W. H. REHN

Under the above head it is intended to note papers received at the Academy of Natural Sciences of Philadelphia and the University of Pennsylvania, pertaining to the Entomology of the Americas (North and South), including Arachnida and Myriopoda. Articles irrelevant to American entomology will not be noted; but contributions to anatomy, physiology and embryology of insects, however, whether relating to American or exotic species will be recorded.

This list gives references of the year 1952 unless otherwise noted. Continued papers, with few exceptions, are recorded only at their first installment.

For other records of general literature and for economic literature, see the Bibliography of Agriculture, Washington, and the Review of Applied Entomology, Series A, London. For records of papers on medical entomology see Review of Applied Entomology, Series B.

NOTE: The figures within brackets [ ] refer to the journal in which the paper appeared, as numbered in the List of periodicals and serials published in our January and June issues. The number of the volume, and in some cases, the part, heft, &c. is followed by a colon (:). References to papers containing new forms or names not so stated in titles are followed by (*); if containing keys are followed by (k); papers pertaining exclusively to Neotropical species, and not so indicated in the title, have the symbol (S).

Papers published in ENTOMOLOGICAL NEWS are not listed.

GENERAL—Berland, L.—Pierre Lesne (1871–1949). [107] 20: 1–16 (Obituary, bibliography, portrait), 1951. **Fenton, F. A.**—Field crop insects. ix + 405 pp. Macmillan Co., New York, 1952. $5.75. **Lindberg, H.**—Odo Morannal Reuter (1850–1950). In memory of the 100th anniversary of his birth. [Comment. Biol., Helsingfors] 12: V–VIII (portrait), 1951. **Nielsen, A.**—The torrential invertebrate fauna. [Oikos] 2: 176–96, 1950. **Roeder, K. D.**—Insects as experimental material. [80] 115: 275–280. **S[chøyen], T. H.**—Ivar Trägårdh. [Norsk Ent. Tidsskr.] 8: 230–31 (Obituary), 1951. **Viette, P.**—Sur la nomenclature des "types." [110] 7: 150–53. **Whittaker, R. H.**—A study of summer foliage insect communities in the Great Smoky Mountains. [25] 22: 1–44.

ANATOMY, PHYSIOLOGY, MEDICAL—Alam, S. M.—The skeleto-muscular mechanism of Stenobracon deesae Cameron (Braconidae, Hymenoptera). An ectoparasite of sugarcane and juar borers of India. Part I. Head and thorax. [Aligarh Muslim Univ. Publ., Zool. Ser.] On Indian Insect Types III: 1–74, 1951, Price: Rs.5/8. **Armstrong, G., F. R. Bradbury and H. Stander**—The penetration of insect cuticle by isomers of benzene hexachloride. [4] 38: 555–66. **Balazuc, J.**—Teratology. (See under Hemiptera.) **Barlet, J.**—Morphologie du thorax de Lepisma saccharina L. (Thysanura). I. Squelette externe et endosquelette. [Bull. Am. Soc. Ent. Belg.] 87: 253–71, 1951. **Barnett, H. C. and E. C. Knoblock**—Chemical and biologi-

cal studies on DDT resistance of lice. [U. S. Armed Forces Med. Jour.] 3 (2): 297–304. **Bayreuther, K.**—Extrachromosomale feulgenpositive Körper (Nukleinkörper) in der Oogenese der Tipuliden. [Die Naturwiss.] 39: 71. **Berger, P.**—Le mécanisme de la photoreception dans l'oeil composé de l'Abeille. [C. R. Acad. Sci.] 234: 1208–09. **Berger, P. et J. Segal**—La discrimination du plan de polarization de la lumière par l'oeil de l'Abeille. [C. R. Acad. Sci.] 234: 1308–10. **Bernheimer, A. W., E. Caspari and A. D. Kaiser**—Studies on antibody formation in caterpillars. [41] 119: 23–35. **Buddenbrock, W. v.**—Vom Farbensinn der Tiere. Pp. 1–80, ill., Kosmos, Stuttgart, 1952. (Insects, pp. 7–23; spiders, 22–24.) **Carayon, J.**—Les fécondations hémocoeliennes chez les Hémiptères Nabidae du genre Prostemma. [C. R. Acad. Sci.] 234: 1220–22. **Carpentier, F. et J. Barlet**—Les sclérites pleuraux du thorax de Campodea. [Bull. Inst. Roy. Sci. Nat. Belg.] 27 (47): 1–7, 1951. **Dalmat, H. T.**—Longevity and further flight range studies on the blackflies (Diptera, Simuliidae), with the use of dye markers. [5] 45: 23–37. **Dreyfus, A., E. Nonato, M. E. Breuer e C. Pavan**—Cromosomas politênicos em vários órgãos de Rhynchosciara angelae N. and P. (Dipt.: Mycetoph.). [111] 11: 439–50, ill., 1951. **Fish, W. A.**—Embryology of Phaenicia sericata (Meigen) (Diptera: Calliphoridae). Part IV. The inner layer and mesenteron rudiments. [5] 45: 1–22. **Flanders, S .E.**—Ovisorption as the mechanism causing worker development in ants. [37] 45: 37–39. **Hassanein, M. H.**—The effects of infection with Nosema apis on the pharyngeal salivary glands of the worker honey-bee. [68] 27: 22–27, ill. **Herter, K.**—Weitere Untersuchungen über den Temperatursinn von Warmblüter-Parasiten. [Zool. Anz.] 148: 139–55. **Hoffman, R. A., A. R. Roth, A. W. Lindquist and J. S. Butts**—Absorption of DDT in houseflies over an extended period. [80] 115: 313–13. **Kästner, A.**—Zur Entwicklungsgeschichte des Prosoma der Solifugen. [Zool. Anz.] 148: 156–68. **Le Berre, J. R.**—Contribution à l'étude du déterminisme de l'envol du Doryphore, Leptinotarsa decemlineata. [C. R. Acad. Sci.] 234: 1092–94. **Legay, J. M.**—Expériences de jeûne absolu au cours du dernier âge de la vie larvaire chez Bombyx mori. [C. R. Acad. Sci.] 234: 885–88. **Marcus, H.**—La conexion de la fibra muscular con el tendon en Acromyrmex silvestri. [Folia Universitaria] 5: 115–16, 1951. Una glandula endocrina y la formacion de la casta trabajadora de

hormigas. *Ibid.* 75–82. **Mittler, S.**—Influence of nutrition upon appearance of tumors in Tu^{50J} stock of Drosophila melanogaster. [50] 115: 271–72. **Moffett, J. O.**—Effect of iodine on the longevity of caged bees. [37] 45: 135. **Pryor, M. G. M.**—On the abdominal appendages of larvae of Trichoptera, Neuroptera, and Lepidoptera, and the origins of jointed limbs. [74] 92: 351–74, ill., 1951. **Robinson, H. S.**—On the behaviour of night-flying insects in the neighborhood of a bright source of light. [68] 27: 13–21, ill. **Rossi, L.**—La membrana di tensione superficiale e la locomozione di alcuni invertebrati aquatici. [Natura, Milano] 42: 81–89, 1951. **Ruttner, F.**—Zur Genetik der Honigbiene (Apis mellifica): ihre Probleme und Möglichkeiten. [Portugalia Acta Biol.] Ser. A. (1949–51): 231–57. **Séguy, E.**—Larves hématophages de Diptères. [110] 7: 93–94, 1951. **Stammer, H. J. und Fr. Wachek**—Ein neuer insektenparasitischer Nematode, Carabonema hasei (n.g., n.sp. (Carabonematidae n. fam.). [Zool. Anz.] 148: 185–93. **Stern, C. and A. M. Hannah**—The sex combs in gynanders of Drosophila melanogaster. [Portugaliae Acta Biol.] Ser. A. (1949–51): 798–812. **Sussman, A. S.**—Tyrosinase and the respiration of pupae of Platysamia cecropia L. [12] 102: 39–47. **Thomas, J. G.**—A comparison of the pterothoracic skeleton and flight muscles of male and female Lamarckiana species (Orth., Acrididae). [68] 27: 1–12, ill. **Valadarez-da-Costa, M. et R. Jacquot**—Effets d'une surcharge en tryptophane sur le développement et la coloration de l'oeil des mutants v et vbw de Drosophila melanogaster en fonction du taux protidique du milieu. [C. R. Acad. Sci.]234: 1214–16. Influence du taux protidique du milieu sur le développement de Drosophila melanogaster mutants v et vbw. *Ibid.* 995–96.

ARACHNIDA AND MYRIOPODA—Kästner, A.—Solpugida. (See under Anatomy.) **Schenkel, E.**—Spinnentiere aus dem westlichen Nordamerika, gesammelt von Dr. Hans Schenkel-Rudin. [Verh. Naturf. Gesell. Basel] 62: 24–62 (*), ill., 1951. **Torres, C. M., H. Lent e L. F. Moreira**—Acarinose das vias respiratórias do canário (Serinus canarius L.) por Sternostoma tracheacolum Lawrence 1948. [111] 11: 399–406, ill., 1951.

SMALLER ORDERS—Barlet, J.—Thysanura. (See under Anatomy.) **Becker, G.**—Beobachtung der Kopulation bei Calotermes flavicollis Fabr. (Isoptera). [Zool. Anz.] 148: 270–73. **Carpentier et Barlet**—Campodea. (See under Anatomy.) **Freeman, J. A.**—Occurrence of Collembola in

the air. [87] 27: 28. **Gisin, H.**—Neue Forschungen über Systematik und Oekologie der Collembolen. [Die Naturwiss.] 38: 549, 1951. **Herter, K.**—Siphonaptera. (See under Anatomy.) **Marcus, H.**—Observaciones morfologicas en Dinjapyx marcusi. [Folia Universitaria] 5: 83–106, ill., 1951. La locomotion de Dinjapyx marcusi. *Ibid.* 107–14. **Nielsen, A.**—(See under General.) **Pryor, M. G. M.**—Trichoptera, Neuroptera. (See under Anatomy.) **Timmermann, G.**—Revision der bei Seeschwalben schmarotzenden Kletterfederlinge der Gattung Quadraceps (C. u. M.). (Mallophaga). [Zool. Anz.] 148: 87. The species of the genus Quadraceps (Mallophaga) from the Larinae. With some remarks on the systematics and the phylogeny of the gulls. [6] 5: 209–22, ill.

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Review

AN INTRODUCTION TO ACAROLOGY. By E. W. Baker and G. W. Wharton. The Macmillan Co., New York. 1952. xiii plus 465 pages, 377 figures. $10.00.

This is the book that has been so long awaited by both beginning and established Acarologists. It has been written by two young men, both excellently qualified for the job, and they have done it well.

The book is divided into eight chapters. Chapter I, the Introduction, devotes 35 pages to a discussion of the history of Acarology, methods of collecting, preparation for study and a brief survey of the external and internal morphology of the mites. Vitzthum in his magnus opus on the Acarina devoted over 400 pages to this phase but Baker and Wharton have presented the salient points in fewer than 40 pages remarkably well.

The following seven chapters are primarily taxonomic. The chapter headings are respectively: The Suborder Onychopalpida, The Suborder Mesostigmata, The Suborder Ixodides, The Suborder Trombidiformes, Hydrachnellae, The Suborder Sarcoptiformes, and Orbatei.

The authors give a general discussion of each suborder and follow this with a key to the families and in most instances also to the subfamilies. Each family is treated as follows: a brief morphological diagnosis, one or more figures of representative species, a list of the genera with their genotypes, a general discussion of the family which reviews what is known of the biologies and economic and medical importance of the included species, and finally the pertinent references to the literature.

The book is copiously illustrated with line drawings. The majority of the illustrations are borrowed from contemporary authors and in all but a very few cases, the figure appears on the same page as the textual matter discussing it. A most happy arrangement.

Baker and Wharton have combined some groups (i.e., Liponissinae and Dermanyssinae) and raised others to family rank that have been generally regarded as subfamilies at the most. There are those who will object to this but after all, that is a matter of small concern as the relationships are still indicated.

Perhaps the item of greatest hope to users of this book will be the keys to families and subfamilies. Probably Baker and Wharton innocently believe their keys are workable! As a matter of fact, for a great many species they are, but the collector of mites will find plenty of specimens that will run to their proper family only by intuitive guidance through the dichotomous maze.

If we believe in the gradual evolution of species we must realize that it is impossible ever to arrive at a classification consisting of clearly defined categories. Keys to families are, therefore, difficult approximations in any group; in the Acarina they are nearly impossible. The authors, therefore, must be given a lot of credit for fashioning keys that do work at least part of the time.

All in all this is a fine book. One of which both the publisher and the authors may well be proud. It is cloth bound and published on fine quality paper. The frontispiece is a color plate of one of the more bizarre red mites.

The book should do much both to stimulate and assist in the pursuit of acarological knowledge.

R. W. STRANDTMANN,
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Lubbock, Texas

EXCHANGES

This column is intended only for wants and exchanges, not for advertisements of goods for sale or services rendered. Notices not exceeding three lines free to subscribers.

These notices are continued as long as our limited space will allow; the new ones are added at the end of the column, and, only when necessary those at the top (being longest in) are discontinued.

Coleoptera—Large quantities of Cicindelidae, Buprestidae, Lucanidae, Cerambycidae wanted in exchange for all families of Coleoptera from Ill., Ind. and Mo. Joseph B. Hayes, 1905 N. Pulaski Rd., Chicago 39, Ill.

American Sarcophagidae—wanted for identification. H. R. Dodge, P.O. Box 185, Chamblee, Georgia.

German lepidopterist wishes to correspond and receive live material (eggs and pupae) in exchange for dried imagoes. Johannes Reichel, Koenigsberg, Krs. Wetzlar 16, Germany.

For exchange—The periodic Cicada, T. septendecim. Desire Lepid., espec. Papil., Sphing. & Speyeria. Also Col., espec. Ceramb. & Lucan. John W. Morris, 2704 Genesee St., Syracuse 9, N. Y.

Cynipid and Itonidid galls—American species wanted; purchase or exchange for British species. Fresh or dried. D. Leatherdale, F.R.E.S., Old Woodstock, Oxford, England.

Wanted—Reprints or papers concerning insects taken in Alaska for inclusion in list of Alaskan insects. R. H. Washburn, Alaska Experiment Station, Palmer, Alaska.

Conopidae of the World wanted. Will pay 10¢ to $1.00 for pinned and labelled specimens. S. Camras, 4407 N. Milwaukee Ave., Chicago 30, Illinois.

Anisoptera—Nearctic sp. wanted for exchange, espec. Ophiog., Arigom., Aeschna, Neurocor., Somatoc., Cordulia, Dorocor., Leucor. R. D. Cuyler, N. C. State College, Raleigh, N. C.

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